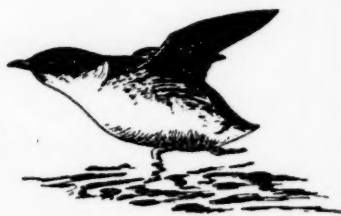


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GROWTH IN THE GLAUCOUS-WINGED GULL

PART I

ZELLA McMANNAMA SCHULTZ

In undertaking a complete life history study of any species of living organism, study of the growth and development of the young is important. The incubation periods of most North American birds are known through only one or two observations and the early development of birds has been a neglected subject. The development of the young of precocial birds has been studied less than that of altricial species, because of the difficulties involved in making extended observations on such active young.

The young of the *Charadriiformes* are all precocial to a greater or lesser degree, varying from the extremely active young of the *Charadrii* through the somewhat intermediate *Lari*, to the young of the burrow-nesting *Alcae*, which are relatively inactive. Young gulls are capable of locomotion, but require feeding and brooding by the parents for some time. They are therefore neither typically nidicolous nor nidifugous, and do not fit exactly into the classifications given by Pettingill (1946: 176-183).

A species in its natural habitat is exposed to many modifying conditions which in turn may bring about opportunities for individual variation. The difficulties of such a study on gulls are numerous, but it has considerable merit in interpreting the characteristics of a species as shown by natural populations, and in showing how some of the individual variations occurring in any species may have been produced.

The study of any organism should not end with its external features. Behavior patterns are as much a part of a species constitution as its structure. In fact, they may be a key to the very problems posed by the museum taxonomist, who, seeing only the skin, may draw erroneous conclusions from the dead specimen. There is a great deal of work that needs to be done on the life histories and specific relationships of the gulls (*Laridae*) of North America. Allen Brooks (1943:19) states: "No family of birds is so badly in need of correlated research in field and study as the gulls, especially in America. . . . The key used by Ridgway in U.S. National Museum Bulletin 50 for the identification of young birds is based upon measurements alone. Collections classified under this system will present extraordinary associations. In one of the largest and most carefully worked museums in America there may be found, in one tray of immature *delawarensis*, two specimens of *californicus*, and three of *brachyrhynchus*, all in their typical juvenal plumages and all labeled *delawarensis*." Undoubtedly, concerted field work in the breeding colonies and in banding studies would do much to clear up the existing confusion in the relationships of the *Laridae*.

The only breeding gull of northwestern Washington is the glaucous-winged gull, *Larus glaucescens*. In this state the species breeds as far south as the Tacoma tide flats in the Puget Sound area (Alcorn, 1949:57), and as far south as Destruction Island on the ocean coast (Dawson and Bowles, 1909:714). The breeding population of the species in the San Juan Island group forms the basis for this study.

METHODS OF STUDY

The study began in the summer of 1947 and extended until the summer of 1951. While the detailed observations on growth were made on Buck Island in the summer of 1949, supplementary data were collected at various times on other islands of the San Juan group. Egg weights were taken on Bare Island, June 15, 1948, on Skipjack Island, June 16, 1948, and on Colville Island, June 14 to 19, 1951. Young gulls, collected from Gull Rock and Bare Island in 1948, and from Buck Island in 1951, were reared in captivity. Eggs were collected from Flower Island, June 21, 1950, for the study of weight loss during incubation. Specimens collected at other times and places are also included in the study.

For a period of approximately six weeks, beginning June 14 and ending August 13, 1949, with a period of absence from July 15 to July 31, observations were made upon a breeding colony of about 135 pairs of glaucous-winged gulls on Buck Island. Buck Island lies at Longitude 123° 55' 02" West and Latitude 48° 27' 01" North, in Davis Bay, at the southwestern corner of Lopez Island. The island is approximately 200 feet long by 150 feet wide, with an extreme elevation of about 35 feet. It was chosen for intensive observation because of its scanty vegetation, relatively even contours, and its accessibility from the adjacent shore of Lopez Island. Coarse grasses, dry in June, cover the top and the small gullies. On the western side there is a rather extensive patch of *Grindelia*. The few shrubs on the eastern edge consist of wild rose (*Rosa* sp.) and salmonberry (*Rubus spectabilis*). It is steep-sided, however, and landing is possible at only a few points. The heavy ground swell from the open waters of the Strait of Juan de Fuca makes the landing of a small boat difficult. During periods of moderate to strong southerly winds, landing is impossible. In order to protect a small boat from the swells, it is necessary to haul it ashore in a small, rocky tidepool. This pool is accessible only at about a zero tide; so the time available for work on the island was limited by the tides as well as by the weather.

At the beginning of the study on June 14, 1949, most of the gulls had finished nest-building, and most of the nests contained sets of two or three eggs. A few sets of single eggs were marked with colored Mongol pencils, so that any additions would be noticed, and also to determine the incubation period. Two gulls were hatched on this date, but were found dead two days later.

As the chicks hatched they were marked, by tying different colored strings on either the right or the left tarsus, and the individual birds were further distinguished by cutting notches in the webs of the feet. The webs were cut to a depth of five millimeters with sharp scissors. By using various combinations of these notches, in all four webs, a sufficient number of combinations could be made to mark all the birds of one day's hatch. At the age of 11 or 12 days the birds were banded with United States Fish and Wildlife Service bands, size 7B. The numbers of the bands were correlated with the color and notch combination, and the birds were recognized during the remainder of the study by their band numbers.

On each day as many young as possible were weighed and measured. Consistent records of individuals were not easily obtained, partly because of the limited time, and partly because they were too well hidden to be found readily. Often an entire brood disappeared completely for a number of days, and some young were found only once or twice during the entire study. Of the 140 young birds marked, 32 were found dead, 61 were finally banded, and the remainder may have been killed, but at least were not found. In some cases the birds of almost an entire day's hatch were

lost; for example, on June 30, 21 birds were marked, but only four were finally banded.

I was absent from July 15 to July 31, and during my absence the birds which were marked to carry the study over this critical period disappeared. There is, therefore, a paucity of data between the twentieth and the thirty-fifth days, which is filled in only by the study of a captive bird from Buck Island, reared in the summer of 1951.

EGG LAYING AND EGG WEIGHT

In *Larus glaucescens* three eggs normally constitute a complete set or clutch, although sets of two are occasionally found. One set of four, which was never incubated, may not have been the work of just one female. However, most sets of one and two are probably the result of the destruction of part of the clutch. The northwestern crow (*Corvus caurinus*) nests on most of the gull islands and destroys eggs there. The eggs are deposited with at least a one-day, and more frequently a two-day interval between them. There may be large discrepancies in size and coloration among the eggs of a single set. The eggs of a set most often are alike, but occasionally all three are different, and the last laid is likely to be smaller and paler than the others. Incubation may begin with the laying of the second egg. On the rather cold night of June 12-13, 1951, on Colville Island, most sets of two had been covered during the night. Of 64 sets, only 12 were cold. In 29 sets of one, on the other hand, 16 were cold and 13 were warm. The latter, however, may have been freshly laid, since laying occurs before 6:00 a.m. in most cases.

Table 1 shows the measurements of 43 eggs taken in 1950 and 1951 in the San Juan Islands. Table 2 shows the weight of 65 eggs taken in 1948, 1950 and 1951. Table 3 shows the weights and measurements of a few sample eggs which were selected to show the extremes of measurements, for which weights were also available. It will be noted that the eggs from Bent, added for comparison, are larger than those of the San Juan Island sample. This may be because there are population differences in egg size, as well as body size, as has been stated by various authors (Coues, 1894:739; Dwight, 1925:243; Dawson and Bowles, 1909:724). Since Bent does not give the localities where his series of eggs was obtained, it is impossible to say whether the San Juan Island population of this species lays smaller eggs than do other populations. I found egg weight averaged 10.7 per cent of the weight of the adult female. The average dry shell weight of 30 eggs was 6.68 grams, which is 7.6 per cent of the average egg weight.

INCUBATION AND HATCHING

The incubation period of *glaucescens* was determined to be not less than 21 days, and probably not over 24 days. In three sets of eggs which had been marked, it was found that the eggs were pipped on the twenty-first day in two instances, and the young hatched on the twenty-fourth day in the other. An egg from the Flower Island group, held in an incubator at 37° C, pipped on the eighteenth day and the chick completed hatching on the twenty-first day. Another egg of this series was pipped on the seventeenth day (after being placed in the incubator) and the chick was hatched by late afternoon of the eighteenth day.

In the wild, the eggs are seldom left unattended after incubation begins, for if sunlight shines directly on the eggs for any length of time, the embryos are killed. Both sexes have three separate brood patches, which may limit clutch size rather

strictly. Occasionally the last egg laid is considerably slower to hatch than the other two, which may be additional evidence that incubation may begin with the depositing of the second egg. Sometimes the adults abandon the last egg before it hatches, even though it contains a live chick.

After the egg is pipped, the chick requires a considerable amount of time before hatching is completed. Anywhere from one to three days may elapse, with an average of 2.75 days. A pipped egg removed to the laboratory on June 21 was hatched the night of June 24, although it had been chilled for 24 hours before it was placed in the incubator. Another pipped egg which failed to hatch in 36 hours was broken open and the chick removed. At that time, there was still some embryonic circulation, and the yolk sac was only partially absorbed, indicating that the young bird was not yet ready to leave the egg. After a few hours, however, the abdominal wall closed over the yolk sac, and the young gull lived and grew normally.

WEIGHT LOSS DURING INCUBATION

In order to determine the loss of weight in gull eggs during incubation, eleven eggs, taken from Flower Island June 21, 1950, were placed, 24 hours later, in an incubator held at 37° C. These eggs were all from sets of one or two, but several were not fresh. Egg number five hatched within four days, number two on the fourteenth day, number nine on the eighteenth day, and number eight on the twenty-first day. Of the remaining seven eggs, two showed, on the twenty-sixth day after being placed in the incubator, embryos which were nearly full term but dead, while three showed partial development, and two showed no signs of development and may have been infertile.

These eggs were weighed almost daily during the period. Table 4 gives the weight loss per day for the series. There were some large differences, but there was no significant difference between eggs that produced chicks and those that did not. The average weight loss after pipping increased to 5.5 grams per day for an average of 2.75 days until hatching was complete. This is an increase of 6.9 times the weight loss per day before pipping. Total weight loss is about 30 per cent, as nearly as can be determined from such a small sample.

DESCRIPTION OF YOUNG

Existing descriptions of young are based on somewhat older birds. Since fading is very rapid, it is thought that a complete description should be included here. The newly-hatched young of *L. glaucescens* is thickly covered with long, silky down. Using Ridgway's "Color Standards and Color Nomenclature," from which the capitalized terms below are taken, the ground color of the down varies from Pale Pinkish Cinnamon to Tilluel-Buff on the underparts, and from Pale Pinkish Buff to Light Buff on the head and upper back. Over the head and upper back, frequently extending to the breast, and occasionally over the entire body, there is a wash of Pinkish Buff to Cinnamon Buff, and even Pinkish Cinnamon in the darker birds. There is a pattern of spots on the head, throat, and upper parts of the body, ranging from Black on head and throat to Blackish Slate on the lower back and flanks. There is a patch of basally black, light-tipped down across the upper breast. The upper surfaces of the wings, the sides and flanks, and occasionally the abdomen, have black or blackish spots, those located on the sides, flanks and abdomen being somewhat elongated toward the posterior. In general, the dark spotting predominates on the dorsal surface and the ventral surface is much paler, often nearly immaculate. There are black pigment spots on the skin of the heel joints, and the

feet are a dusky flesh color. The feet become entirely black in a few hours. The bill is black, with the terminal third brown; the egg tooth is white. The eyelids are black, the iris so dark that it can scarcely be distinguished from the pupil.

As the bird grows older, the down bleaches and becomes much grayer. The Black spots fade to Fuscous Black. The egg tooth is lost during the first week, usually about the fourth day. By the second week the black of the basal portion of the bill is encroaching upon the brown tip, and usually obliterates it completely.

GROWTH

Measurements of the bony parts are more uniform indicators of growth than weight. Four measurements were taken of the juvenile gulls, i.e. tarsus, middle toe and claw, culmen, and wing without feathers. Measurements were taken with a steel tape calibrated in millimeters. Culmen measurements in the conventional manner were found impractical in the living birds, and were modified so that the measurement was taken at right angles to the depth of the bill, from the exposed culmen to the tip. The measurements do not necessarily include the same specimens on succeeding days, since the samples were taken at random.

Table 5 shows the growth of the tarsus. Tarsal growth is most rapid up to about the twentieth day, and then slows down a great deal. This slow rate of increase probably continues for some time, even after the birds are able to fly. None of the young birds had attained the adult average tarsal length by the forty-fifth day. Our hand-reared juvenile still had not achieved this when released at the age of 62 days.

In the case of the middle toe and claw, however, growth increased from a range of 27-35 mm. (average of 30 specimens: 31.5 mm.) in the day-old chicks to the adult minimum (62 mm.) by the thirteenth or fourteenth day. One young bird exceeded the adult average (71.4 mm.) by the twenty-fourth day.

Table 6 shows the rapid growth of the wing without feathers. The wing is much smaller relative to its ultimate size when the bird begins post-natal life, averaging 17.5 per cent of adult length; while the tarsus averages 32.4 per cent, the middle toe and claw 44.1 per cent, and the culmen 32.2 per cent of adult size. Wing measurements were not taken on the wild birds after the twenty-fourth day, because of the serious risk of injury. On our captive, it was found that by 39 days of age, the bony portion of the wing was full size, and did not increase, although the feathers continued to grow. In *L. glaucescens* flight proficiency is achieved by the age of 45 days, which is quite in keeping with observations on the growth of the wing.

Table 7 shows the growth of the culmen. The growth was less rapid than that of either the tarsus or the middle toe and claw, and continued steadily, up to the taking of the last measurement. This growth probably continues slowly for a considerable period after the bird is able to fly. Dwight (1925:106-107) states that young gulls, when the wings and tail are fully grown, are only a little smaller than adults except for the bill, which is slower in attaining its full growth. Coues (1894:739) states that very old birds are likely to be larger, with especially stouter bills, than young or middle-aged ones. Growth of the culmen, then, may continue very slowly throughout the bird's life. Obviously it must grow enough to replace the wear, and it may perhaps exceed the amount of wear sufficiently to increase in size as the bird ages.

WEIGHT

The young of *L. glaucescens* at hatching weigh about 6.7 per cent of their weight at the age of eight weeks. Table 8 shows the increase in weight of the young gulls up to 50 days. As with the measurements, the weights are not necessarily of the

same individuals on succeeding days. Weights were taken with a balance graduated in grams and tenths of a gram. Birds were enclosed in a light cardboard box or paper bag for weighing. Most birds which had been fed regurgitated their food before being weighed, so that a full gullet was seldom a factor in weight gain or loss. Weight, however, is a less reliable criterion of growth than measurements, because it is subject to variations depending on the weather, the time of day, and amount of food in the digestive tract. Accuracy is sometimes difficult because of the struggles of the subject.

Averages of weight obscure an interesting phase of growth which can be noted on individual records. There is no period of actual weight loss in the gulls, as has been recorded for some other birds. However, there is a period between the fifteenth and twenty-third days when the rate of gain drops off slightly. Of 13 individual growth curves examined, 11 show a distinct slackening of growth for a period of three to five days, somewhere between the fifteenth and the twenty-third days. Since these records were not all taken at the same time, the possible influence of tides and availability of food does not appear to be involved. In seven out of the 13, this change in growth rate appeared between the fifteenth and eighteenth days, while in four others the slackening showed, less abruptly, between the eighteenth and twenty-third days. It appears that the later it comes, the less marked but longer lasting it is.

There is an average difference of about 150 grams between adult males and females in this species of gull. The weights of some specimens, both wild and hand-reared, show this distinction. After the twenty-fourth day, the weights of the young gulls fall into two relatively distinct groups, and this is probably an indication of the weight differences between the sexes that is apparent in adults. This cannot be proven as yet, however, for it is impossible to tell the sex of living young gulls, and none were killed to determine sex. One juvenile female, collected over Bare Island after she was well able to fly (at least 45 days old) weighed 871.0 grams. Boss (1943: 197-198) reports that his hand-reared herring gulls had uniform weights at hatching, and that beginning with the second month a sexual difference in weight became apparent. By the third month the males weighed about 200 grams (or 25 per cent) more than the females. If this is true in the wild, it would explain the two distinct weight groups which appear in the birds I studied in the field. By the age of 30 days in the wild, one bird had attained a weight well within the adult range. The gulls hand-reared in 1948 gained weight much more slowly than those in the wild, probably because their food supply was inadequate, or lacking in protein. This was not true with the single hand-reared gull in 1951, which grew as well as the wild-reared young had done in 1949.

Pettingill (1946:182) states that the weight of the young precocial bird is from one to six per cent of the weight of the adult female. In *L. glaucescens* the young bird weighs about 8.3 per cent of the weight of the adult female. This falls within the range which Pettingill gives for altricial young. Precocial birds, according to Pettingill, attain flight while weighing from 60 to 70 per cent less than the weight of the adult female. Gulls, however, attain flight at a time when some of them, at least, already weigh as much as the adult female. Probably no young gull attains flight before it weighs about 85 to 90 per cent of the weight of the adult female. In this respect, gulls are to be considered altricial birds.

(To be continued)

TABLE 1. Measurements of 43 Eggs of *Larus glaucescens* from the San Juan Islands

	Bent's				
	Maximum	Minimum	Average	Average	Variation
Length	80.0	61.0	70.6	72.8	19.0
Breadth	53.5	44.0	48.8	50.8	9.5

TABLE 2. Weights of 65 Eggs of *Larus glaucescens* from the San Juan Islands

	Bent's		
	Bare and Skipjack Islands	Flower Island	Colville Island
	June 15, 16, 1948	June 21, 1950	June 17-19, 1951
Number	35	11	19
Maximum	103.3	99.7	101.5
Minimum	72.5	62.5	70.2
Average	87.6	88.7	86.6
Total Average Weight	87.6 grams		
Variation	40.8 grams		

TABLE 3. Range in Length and Width of Eggs (with their Weights) of *Larus glaucescens* from the San Juan Islands. Comparative Measurements from Bent

	Length	Breadth	Weight
Longest	74.0	50.0	97.0
Shortest	63.0	50.0	85.3
Widest	73.7	51.6	101.5
Narrowest	66.0	44.5	70.2
BENT:			
Maximum	73.5	55.0	
Minimum	66.0	47.5	

TABLE 4. Weight Loss (in grams) Per Day, Before and After Pipping, in Eggs of *Larus glaucescens* Taken from Flower Island, June 21, 1950

Egg Number	Condition	Weight Loss Per Day	Weight Loss After Pipping	Chick Weight
1	Infertile	.396		
2	Viable	.77	17.4	59.5
3	Non-viable	.665		
4	Viable	.704		
5	Viable	Hatched		58.3
6	Viable	.642		
7	Non-viable	.381		
8	Viable	.659	17.1	59.3
9	Viable	.96	11.4	63.8
10	Non-viable	.86		
11	Infertile	.796		
Ave. of Viable Eggs		.747		

*Immature birds are birds from flight proficiency to about three years old.

TABLE 5. Growth of Tarsus of *Larus glaucescens*

Age	No. of Specimens	Range	Average
1	30	19-25	21.3
2	6	20-27	23.8
3	4	21-32	26.2
4	16	23-31	26.9
5	17	23-36	29.17
6	6	27-36	32.8
7	12	29-35	31.0
8	10	32-43	35.0
9	16	29-47	34.9
10	2	34-38	36.0
11	12	31-43	38.8
12	6	40-45	41.1
13	7	39-45	42.3
14	9	41-51	47.7
15	10	44-50	46.4
16	8	46-49	48.1
17	7	46-56	50.0
18	15	46-52	49.6
19	5	48-53	50.4
20	9	46-56	51.5
21	3	55-56	55.3
22	4	51-54	52.5
23	1	51	
24	4	53-61	56.5
28	3	54-62	57.7
32	3	55-60	57.2
34	2	61	
36	3	53-61	57.2
37	3	55-60	56.7
39	1	56	
40	1	58	
41	1	61	
45	1	61	
Adult	20	59-77	65.7

TABLE 6. Growth of Wing Without Feathers of *Larus glaucescens*

Age	No. of Specimens	Range	Average
1	30	20-28	22.8
2	6	23-27	25.1
3	4	20-26	23.5
4	16	25-32	29.2
5	17	23-38	29.6
6	6	28-38	32.8
7	12	30-36	33.3
8	10	31-51	39.5
9	16	30-55	41.4
10	2	40-52	
11	12	38-55	48.5
12	6	50-66	54.5
13	8	45-70	57.6
14	9	60-80	69.3
15	10	65-85	72.4
16	8	60-80	72.6
17	7	75-90	82.6
18	14	70-97	83.2
19	5	85-110	95.0
20	8	85-110	95.2
21	3	100-110	103.0
22	4	100-110	105.0
23	1	115	
24	4	115-120	119.0
Immature*	3	125-135	130.0
Adult	2	130-140	135.0

TABLE 7. Growth of Culmen of *Larus glaucescens*

Age	No. of Specimens	Range	Average
1	30	15-19	16.7
2	6	16-18	17.0
3	4	17-18	17.7
4	16	17-21	19.2
5	17	18-21	19.4
6	6	20-24	21.0
7	12	19-23	21.5
8	10	20-26	22.7
9	16	22-30	24.9
10	2	25-29	
11	12	24-31	27.2
12	6	25-29	27.7
13	8	25-30	28.1
14	9	26-35	31.0
15	10	27-33	30.3
16	8	30-34	32.1
17	7	30-37	34.0
18	15	29-35	32.5
19	5	33-38	34.8
20	9	31-40	34.7
21	3	37	
22	4	34-40	37.0
23	1	35	
24	4	33-42	37.5
28	3	36-41	38.2
32	3	36-44	40.7
34	2	43-46	
36	3	42-50	45.0
37	3	40-44	41.0
39	1	50	
40	1	44	
41	1	50	
45	1	46	
Adult	19	42-60	51.8

TABLE 8. Growth by Weight of Young of *Larus glaucescens*

Age	No. of Specimens	Range	Average
1	94	44.0-88.5	67.85
2	11	70.0-123.5	89.6
3	12	72.0-140.5	100.4
4	19	82.5-168.5	130.4
5	15	104.5-191.5	137.7
6	1	169.5	
7	13	153.0-225.0	182.4
8	4	221.2-277.5	238.8
9	8	202.0-288.5	231.9
10	5	239.0-348.0	292.4
11	9	255.0-351.0	308.6
12	2	282.0-339.0	310.5
13	7	298.5-470.0	388.6
14	12	384.5-510.0	448.8
15	9	368.0-483.0	431.2
16	7	393.0-456.5	429.0
17	6	444.5-558.0	507.0
18	15	430.0-577.0	496.9
19	7	499.0-650.0	557.7
20	6	485.0-670.0	578.8
21	3	565.5-678.0	620.3
22	4	611.0-725.0	642.7
23	1	605.0	
24	4	691.0-815.0	749.6
30	2	713.0-998.0	855.5
35	2	795.0-988.0	891.5
36	1	973.0	
37	5	809.0-1087.0	922.5
38	4	833.0-990.5	909.6
39	5	766.0-1181.0	984.2
40	2	820.0-1029.0	924.7
41	1	879.0	
42	2	804.0-846.0	825.0
44	2	857.5-873.5	865.5
47	1	864.5	
48	1	884.5	
49	1	880.5	
50	1	872.0	

GENERAL NOTES

Four Unusual Bird Records for Eastern Washington.—The following bird records were obtained in the region of O'Sullivan Dam, Grant County, Washington, during the summer of 1951.

White-faced Glossy Ibis (*Plegadis mexicana*). One bird was observed by Oliver A. Bond of Sunnyside, Washington, and the author on May 26, two miles northwest of O'Sullivan Dam. It was first observed about noon, but was sighted four additional times during the afternoon, as it flew from one large pothole to another. It was last seen about 5 p.m. when it flushed from bulrushes (*Scirpus acutus*) in a large pothole (about 25 acres). After the bird flew from this pothole, it circled higher and higher until it was lost from sight. On June 2, what was presumably the same bird was flushed from the pothole where it had been first observed the previous week.

Apparently this is the second record for this species in eastern Washington. Sloanaker (*Condor*, 27: 211, 1925) reported a specimen killed by P. J. Thelen at Clear Lake, about 17 miles southwest of Spokane, and taken to a Spokane taxidermist's shop on October 30, 1909.

Marbled Godwit (*Limosa fedoa*). An individual of this species was observed several times on June 2, as it fed along the margins of flooded saltgrass (*Distichlis stricta*) flats one mile northwest of O'Sullivan Dam. The bird was collected the following day, and the skin subsequently placed in the Charles R. Conner Museum at the State College of Washington. On August 30, one marbled godwit was sighted one mile north of O'Sullivan Dam. This bird was very wary and appeared restless, flying long distances when flushed.

Western Willet (*Catoptrophorus semipalmatus inornatus*). One bird was observed on a flooded saltgrass flat one mile northwest of O'Sullivan Dam. The bird was watched for several minutes as it fed in the company of mixed common shore birds.

Hudsonian Curlew (*Phaeopus hudsonicus*). One bird was observed feeding on a large flooded flat one mile northwest of O'Sullivan Dam on June 11. The specimen was collected and the skin deposited in the Charles R. Conner Museum.

All of the foregoing observations were made in good light at close range, using 7 x 50 binoculars. The author believes that the observations for the last three represent the first records for these species in eastern Washington.—STANLEY W. HARRIS, *Wildlife Management, State College of Washington, Pullman.*

* * *

Eastern Blue Jay (*Cyanocitta cristata*) at Pullman, Washington.—During December, 1950, my son Fred informed me that a blue jay was staying about the yard at the Dana L. Cleveland home, about a mile and a half south of Pullman. At my suggestion this bird was collected by Phillip Cleveland on January 4, 1951. Mrs. Cleveland stated that it had been in the vicinity for several weeks.

The specimen is a female, number 51-5, in the Charles R. Conner Museum collection: weight 102.1 gm., length 306 mm., extent 398 mm. The wings and tail show no unusual wear that might suggest escape from captivity.—GEORGE E. HUDSON, *State College of Washington, Pullman.*

A Record of *Larus leucopterus* from Westport, Washington.—While examining the collection of *Larus glaucescens* in the Washington State Museum, University of Washington, Seattle, I noted a specimen which seemed distinctly smaller than the rest. This bird was sent to the U. S. Fish and Wildlife Service in Washington, D.C., for identification. It was returned to us with the notation by Allen J. Duvall, that it is *Larus leucopterus leucopterus*, The Iceland Gull, apparently the first record from this state. The data are as follows: WSM catalogue number 11601, D. E. Brown, June 15, 1934, Westport, Grays Harbor County, Washington, female, length 21.00 inches. Measurements taken from the skin are: culmen 49 mm., depth of bill at angle 8 mm., tarsus 77 mm., middle toe and claw 62 mm.

The entire plumage has an ivory cast, with faint brown markings present on most body feathers, strongest on the lower back, the underparts and the crown. There is a patch of very faded dull-gray on the upper back. The primaries are very worn, the shafts horn-color, the webs brownish. The tertiaries and scapulars are extremely worn. The rectrices are brown, boldly marbled with white on both webs.

The bird differs from any local species. Bleached specimens of *glaucescens* nearly match it in color, but are much larger. The bill is too long and slender, the angle too slight to be *californicus*; the middle toe and claw are too long to be *delawarensis*; and the bird is too small to be *argentatus thayeri*. Unfortunately the collector made no notes as to the color of the soft parts. It is impossible to make any estimate of age because of the worn condition of the plumage.—ZELLA McMANNAMA SCHULTZ, Seattle, Washington.

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NOTES FROM THE FIELD

Bat Pursues Nighthawk.—As it was growing dark on the evening of August 11, 1950, I watched two bats flying among yellow pine trees in the mountains 15 miles northwest of Naches, Washington. They were feeding over a small clearing and around the trees. After ten minutes or so had elapsed, I saw one of the bats chase a nighthawk (*Chordeiles minor*) approximately 100 feet, dodging about on his tail. The bat probably was either *Eptesicus fuscus* or *Lasiurus noctivagus*, since I shot four of these bats among pines at Rocky Prairie, about two miles farther up the Bald Mountain road, during the next few days. Three of the specimens taken were male silver-haired bats with large testes averaging 7×5 millimeters; the big brown bat was a lactating female.

I believe that the bat was defending its territory when it chased the nighthawk. A rather cursory search in the literature has turned up no accounts of bats pursuing birds larger than themselves. Territoriality in bats is not well documented, as one might expect in view of their nocturnal and aerial habits, but it may apply to some species. Dalquest (*Mammals of Washington*, 1948: 167) saw a big brown bat that repeatedly flew up and down a strip of road. When a second bat approached down the road, the two fluttered around and squeaked for about a minute and then resumed hunting. He also has observed that big brown bats ignore other species of bats hunting on their territory. Does this apply to birds as well? In Nevada, Bole once saw two male big brown bats fall to the ground fighting and squealing (Hall, *Mammals of Nevada*, 1946: 156). Burt (*Mammals of Michigan*, 1946: 117) has expressed his belief that the red bat (*Lasiurus borealis borealis*) has individual areas that are hunted night after night.—HAROLD E. BROADBOOKS, Department of Zoology, University of Arizona, Tucson.

ADDITIONS TO SOCIETY LIBRARY

PETERSON, ROGER TORY. 1951. *Wildlife in Color*. Houghton Mifflin Co. Sponsored by the National Wildlife Federation. 189 pp. Cloth, \$3.00.

Preserved and brought together in this little volume are 453 of the full color illustrations originally issued as a series of poster stamps by the National Wildlife Federation. These miniature illustrations were produced by eighteen of America's leading wildlife artists between 1939 and 1951.

The book is more than a picture gallery, however. The illustrations are assembled to depict the various habitats of North America, with the trees, flowers and animals to be found in each. The lively account of Mr. Peterson integrates the pictures, producing an enjoyable excursion into the field of

ecology. Anyone who enjoys the outdoors is lead painlessly to the idea that all wildlife is closely knit in a community where everything is interdependent. For good measure the illustrations are indexed by common names, accompanied by the scientific names.—MARTHA R. FLAHAUT.

ALLEN, ELSA GUERDRUM. 1951. *The History of American Ornithology Before Audubon*. Philadelphia, American Philosophical Society, Transactions, new series, vol. 41, part 3, pp. 387-591. Paper, \$2.00.

Mrs. Arthur A. Allen, Research Associate in Ornithology at Cornell University, studied manuscripts, correspondence and illustrations not previously published. She made several trips to Europe, and consulted all available source material both abroad and in America.

While reading the list of acknowledgments in the preface this reviewer was impressed with the prodigious task Mrs. Allen set for herself. She started with the premise that "Modern ornithologists are indebted to the vast stores of bird lore gradually assembled and made ready for them by their predecessors. . . . It is the purpose of this book to look back on the pages of history and try to recapture the lives and studies of the principal workers on birds from Aristotle to Audubon." Just a glance at the pages will convince the reader how well Mrs. Allen has fulfilled her objective.

In this paper are accounts of many almost forgotten persons who contributed much to the early knowledge of birds in America. For example, we should be particularly grateful to her for unearthing as much as could be found about Mark Catesby, the mystery man of American ornithology.—MARTHA R. FLAHAUT.

COMMENTS AND NEWS

The Pacific Division of the American Association for the Advancement of Science will hold its meetings at the Oregon State College, Corvallis, Oregon, June 16-21, 1952. The Pacific Northwest Bird and Mammal Society is planning to hold a meeting during that week, the exact date to be announced later. Members of the Society are invited to join the Western Division of the American Nature Study Society on a field trip to Mary's Peak, near Corvallis, on Thursday, June 19.

The convoy will leave Corvallis at 6:00 a.m., and return at 12:00 noon. Camp breakfast will be served at Mary's Peak by the Obsidian Princesses. Please make reservations for breakfast by notifying Ruth E. Hopson, Route 2, Box 111, Corvallis, Oregon, by June 10. The sessions of the Western Division of the American Nature Study Society will be held in the afternoon on June 17 and 18.

Dr. James Dean Terry, 68, Seattle dentist for thirty-one years, died in his office of a heart attack on September 14, 1951. He was born in Pontiac, Illinois, and graduated in 1905 from the University of Michigan School of Dentistry. Dr. Terry came to Seattle in 1920. He had been a continuous member of the Pacific Northwest Bird and Mammal Society since 1925.

SOCIETY MEETINGS

NOVEMBER, 1951.—The first regular meeting following the summer recess was held on November 17, 1951, at the Washington State Museum on the University of Washington campus, Seattle. The meeting was called to order by President Webster H. Ransom at 8:20 p.m.

The minutes of the previous meeting were read and approved.

The following persons were elected to membership: F. H. Armstrong, U.S. Forest Service, Bly, Oregon; Mrs. J. A. Eberhardt, Ontario, California; James R. King, Department of Zoology, State College of Washington, Pullman; Dr. Paul M. Mickens, Tacoma, Washington; Bill F. Musgrove, Zoology Department, University of Idaho, Moscow. J. A. Munroe, a charter member, was reinstated to membership.

Meetings for the year were announced as follows: December, Pacific Lutheran College, Parkland, Washington; January, Nanaimo, British Columbia; February, Vanport College, Portland, Oregon; March, College of Puget Sound, Tacoma, Washington; April, Annual Meeting, University of Washington, Seattle; May 17, University of Idaho, Moscow.

A number of members told of their summer activities. John Slipp displayed his much publicized albatross (*Diomedea cauta*) taken

off the Washington coast. The Museum had placed on display other species of albatrosses, including an old specimen of wandering albatross for comparison. Ray Albright showed colored motion pictures taken at Churchill, Manitoba, the past summer.

The meeting was adjourned and the members and guests enjoyed a coffee hour while exchanging further summer experiences.—MARGARET A. IVEY, *Secretary*

DECEMBER, 1951.—A regular meeting was held on December 15, 1951, at the Pacific Lutheran College, Parkland, Washington. The meeting was called to order by President Ransom at 8:15 p.m.

The minutes of the November meeting were read and approved.

Dr. Paul V. Gustafson, Department of Microbiology, University of Washington, Seattle, was elected to membership.

Mrs. Flahaut announced the death of Dr. J. D. Terry, who had been a member of the Society since 1925.

Kenneth M. Walker, now on the teaching staff of the College of Puget Sound, consented to continue as vice president for the Oregon region for the rest of the official year.

Dr. C. Wesley Clanton talked on "Population Fluctuations in the Rodent *Lagurus* and Their Implications in the Incidence of Plague."

Mr. Henry Lunetti of the Health Department, City of Tacoma, spoke about rat control in Pierce County, and showed two films produced by the U.S. Public Health Service which recorded the life history of brown, black and roof rats.

Dr. Murray L. Johnson spoke briefly about psitticosis having been detected in purple finches.

After a lively question and answer period the Society adjourned to enjoy coffee and refreshments provided by the Mesdames Leraas and Ostenson.—MARGARET A. IVEY, *Secretary*.



THE MURRELET

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